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By-Stevick, Earl W.

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The morphotonemics of Ganda have been particularly troublesome to linguists trying to describe the tonal structure of Bantu languages. Ganda has three surface tones, and changes in the surface tones parallel changes in grammatical function only part of the time. The author has found that a description of Ganda tones becomes manageable if instead of comparing surface patterns the linguist looks for underlying entities and a set of ordered rules. This paper reports on (1) the kinds of units and rules that are needed for Ganda and (2) suggests some implications for comparative Bantu tonology. (DO)

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Earl W. Stevick
Foreign Service Institute
26 July, 1968

VERB TONES IN GANDA

In the never-ending war against the buzzing, blooming chaos of natural speech, a descriptive linguist is an agent of control. One sector in which we have recently begun to challenge the sway of chaos is in the tonal structures of Bantu languages.

In this area, the morphotonemics of Ganda has been particularly troublesome. The inventory of surface tones is easy enough: high level, written with ´ ; low level written with ` ; and high falling written with ^ . The problem is in stating the morphotonemics. Changes in surface tones parallel changes in grammatical function some of the time, but the overall picture is bewildering. Table 1 is a small sample, but I don't expect you to stop and be bewildered while I am reading this paper. Table 1 is principally for corroboration and future reference. It contains 8 present tense forms for each of 6 verbs. The left-hand half is affirmative and the right-hand half is negative. For each verb, the top line is indicative and the lower line is relative. The forms are given in pairs, first without the object prefix /gu/ (as in #1,3) and then with /gu/ (as in #2,4). The forms of the verb 'to see' (#25-32) have the stem /laba/. They are given in translation at the bottom of p.1. They are [READ & TRANSLATE].

Many of you will not be surprised to hear that description of Ganda tones becomes manageable if instead of comparing surface patterns we look for underlying entities and a set of ordered rules. Our purpose this morning is not to make you understand Table 1, but merely (1) to report on the kinds of units and rules that are needed for Ganda, and (2) to suggest some implications for comparative Bantu tonology.

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At the most abstract level that we will be dealing with, there are syllables, and each syllable has one or two moras. (A mora is basically a unit of length.) Each mora is either 'tonic' or 'non-tonic'. 'Tonic' and 'non-tonic' are my own terms; they are supposed to stand for the deep distinction that corresponds to surface tones. They are abstractions: either a tonic or a non-tonic mora may turn out to have either high or low tone.

Table 2 shows the same forms as Table 1, except that it shows deep structure. Tonicity is written as underlining. The prefixes show an obvious uniformity of marking in Table 2. The prefix /ba/ '3 pl. subject' used in all the forms is always tonic; /gu/ '3 sg. object' used in all even-numbered forms, is never tonic; /te/ 'negative indicative' in 3, 4 etc. is always non-tonic but must be followed by a tonic mora; /ta/ 'negative relative' in 7, 8 etc. is always tonic; /a/ 'initial vowel of relative forms' is never tonic.

The underlining of the stems is more complicated. It is quite usual for a Bantu language to divide its verbs into two tone classes, which we are here calling the tonic and the non-tonic classes. For each of these two classes, Tables 1 and 2 give a sample verb for each of the most common CV structures. The first pair of verbs are CVV, the second pair are CVCV, and the third pair are CVVCV. But the tonicity of the verb stems is assigned according to three different patterns. These are abbreviated BB, BT and BX, and appear (just below the middle of p.2). Each is illustrated by one long stem of each tone class. B stands for "basic", T stands for "tonic" and X stands for "complicated". Pattern BB is used with affirmative indicative forms. In BB, the first two moras of the stem have their basic state, tonic for /leeta/ as a member of the tonic class and non-tonic for /kweeka/ as a member of the non-tonic class. Any remaining moras are non-tonic. In BT,

which is used for all negatives, the first mora is in its basic state, and all remaining moras are tonic. In BX, used with affirmative relatives, the first mora is in its basic state. For stems of the tonic class, like /leeta/, the last mora is also tonic. For stems of the non-tonic class, like /kweeka/, BX is like BT, with an exception that doesn't show up in these examples.

We have now completed the process of specifying which moras are tonic in the deep structure. That is to say, we have accounted for all of the underlining in Table 2. The transition from Table 2 to the surface tones of Table 1 is made through a series of 5 ordered rules. The first of these rules is by far the most complicated. Its purpose is to tell how the tonic moras affect each other's pronunciation. It is at the bottom of p.2. Capital N stands for 'non-tonic', T stands for 'tonic', Q stands for 'either tonic or non-tonic'. These abbreviations are listed at the top of p.2.

For clearer exposition, we will take up Rule 1 one part at a time. The first parenthesis, which stands for an indefinite number of non-tonic moras, doesn't change from the left side to the right side, so we will go on to the second parenthesis. This says that if there is a tonic mora, followed by zero to n moras either tonic or non-tonic, ending with a non-tonic mora, plus the obligatory T (tonic mora), then those two tonic moras are high, and everything in between them is also high. This we will call the 'high spreading rule'. Examples are given opposite this rule near the bottom of p.2, are 37, 45, 46, and the moras that receive high tone as a result of this rule are marked with acute accents.

The next parenthesis has a single N with a ligature under it. This stands for a non-tonic mora that is part of the same syllable as the tonic mora that follows it. The example given involves the syllable

/kwee/. The result of the rule is that both moras of the long vowel are high.

The next parenthesis (T_n) together with the obligatory T refers to a continuous series of tonic moras, not subject to the high spreading part of the rule. In these sequences, the first mora is high and the rest are low. So This we will call the 'dissimilation rule'. Examples are given in the last line of p.2 ~~are~~ 41, 47, 48. Again, moras whose tones are determined by this rule are marked with accents. Read

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The second rule, at the top of p.3, uses the symbol (|) to stand for word boundary. It says simply that word-final high becomes falling tone. Examples are 5 and 46, and 46 was also used as an example of the 'high spreading' part of Rule 1. Read

The third rule uses (.) to stand for syllable boundary and (|) to stand for word boundary. It says that a word-final sequence of low or non-tonic followed by one or more non-tonic syllables, comes out as low followed by one or more highs. Examples are 33, 34, 41. Notice that the highs that Rule 3 produces are not subject to Rule 2.

Otherwise, and this is Rule 4, non-tonic moras are realized as low. Examples are 1 and 37.

Last of all, By Rule 5, a two mora syllable at the end of a word is pronounced short. A falling tone, if there is one, is retained. The crucial example of this is #5, where we have an otherwise impossible final sequence of high plus falling tones.

Table 1 showed tones for single words. In fact, however, these tones are subject to some variation. The reason for the variation is that the domains of Rules 1 and 3 are not limited to single words. They

may or may not extend beyond single words, depending on the grammatical constructions that are involved. For one quite heterogeneous list of constructions, Rule 3 applies across the boundary, but Rule 1 does not. These boundaries I mark with the symbol /+/, and the tones in Table 1 are the tones that occur before such a boundary. For another equally heterogeneous list of constructions, Rules 1 and 3 both extend across the boundary. I mark these boundaries with a hyphen. For a third list, also quite diverse, Rule 3 applies up to but not past the boundary, and Rule 1 does not apply at all. These boundaries I mark with /#/. There is a fourth kind of boundary, before which neither Rule 1 nor Rule 3 applies. This I mark with a single slant line, or 'bar.' Remember however that these 'tonal juncture' symbols have no independent status in the analysis. Nor are they anything like the phrase terminal junctures postulated by Trager and Smith for English.

So! The data that are required in order to predict surface tones are then (1) the underlying morphemes in terms of syllables and their tonic and non-tonic moras, and (2) the morphological and syntactic constructions. That's all. On the basis of the constructions, one can predict the junctures. The junctures in turn determine the ways in which the tone rules will convert underlying tonicities into surface tones. And the system that I have sketched holds good for the entire sentence, not just for present tense verbs.

This analysis is an extension and at the same time a considerable simplification of some earlier articles by A.E. Meeussen. By itself, it may sound like just another piece of ad hokum. In fact, however, each of the rules is ~~found~~ needed in at least one other Bantu language besides Ganda. This brings us to the implications for comparative study. Let me begin by mentioning two isolated points.

The stem tonicity patterns BB and BT, just below the middle of p.2, also occur in a number of other Bantu languages, and in comparable morphological circumstances. The surface tones of Ganda completely obscure those important correspondences, however. An example of BT is the set of forms that mean 'we don't cultivate', shown on the handout:

Ga.	Ru.	Sh.
tètúlímâ	ntìtúrìmá	hàtírìmí

The underlying tonicities for these three forms--shown by underlining the tonic moras, are identical. The recovery of these two stem tonicity patterns from beneath the surface clutter is to me a particularly strong vindication of this style of analysis, and suggests that it may be a prerequisite to satisfactory historical study of Bantu tonal systems. The differences in surface tones suggest a further hypothesis, that each tone rule may have its own distribution across languages. In this example, Ganda has the first part of Tone Rule 1--the so-called high spreading rule--while Rundi and Shona do not. On the other hand, the infinitives meaning 'to send a person', the last item on p.3 of the handout, show that Ganda and Rundi share the dissimilation rule, while Shona does not, at least in this environment.

Ga	Ru	Sh
ðkùtúmà	kùtúmà	kùtúmá

More generally, one can say of Ganda, but also of Rundi and Shona and many other Bantu languages, that 'the lexicon of this language has two kinds of mora: tonic and non-tonic. One set of ordered rules redistributes tonicity of stem syllables on a morphological basis. A succeeding set of ordered rules converts tonic moras into high and low tones, and perhaps into other tones as well. These rules depend on recognition of more than one kind of boundary ('juncture') within the utterance. One of the tone rules involves dissimilation between adjacent tonic moras. Another rule involves the spreading of high tone, starting from a tonic mora and extending over non-tonic moras.

Comparable rules of dissimilation and spreading do not exist for non-tonic moras.' This suggests that in the parent language, the contrast may have been between presence and absence of tone, rather than between separate high and low tones, which we usually reconstruct.

Still more generally, ordering of the rules may be almost as important as distinguishing between deep and surface structure. Meeussen's re-analysis of Ganda followed his equally brilliant re-analysis of Tonga, a language with quite different surface morphotonemics, spoken 1000 miles to the south. The rules for the two languages, though different, match each other almost point for point, sometimes like mirror images, yet Meeussen did not remark on this striking fact, perhaps because he thought it was too obvious, but more likely because he was more interested in the rules themselves than in the relationships among them.

Most generally of all, if you appreciate the intricate regularities of human speech, and if you enjoy finding the deeper consistencies beneath superficial chaos, then black languages can be pretty beautiful, too.

Earl W. Stevick
Foreign Service Institute
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VERB TONES IN GANDA

Table 1. Surface patterns.

	Affirm.		Neg.	
	w/ obj.	w/o obj.	w/ obj.	w/o obj.
Indicative Relative	1bàsà, 5àbàsâ,	2bágùsá 6àbágúsâ	3tèbàsâ, 7àbátàsâ,	4tèbágúsâ 8àbátágúsâ
Indicative Relative	9bályà, 13àbályà	10bágúlyâ 14àbágúlyâ	11tèbályà, 15àbátàlyà,	12tèbágúlyâ 16àbátágúlyâ
Indicative Relative	17bàsòmá, 21àbàsómâ,	18bágùsómá 22àbágúsómâ	19tèbàsómâ, 23àbátàsómâ,	20tèbágúsómâ 24àbátágúsómâ
Indicative Relative	25bálàbà, 29àbálàbà,	26bágúlábà 30àbágúlábà	27tèbálàbà, 31àbátàlàbà,	28tèbágúlábà 32àbátágúlábà
Indicative Relative	33bákwèèká, 37àbákwéékà,	34bágùkwééká 38àbágúkwéékà	35tèbákwéékà, 39àbátákwéékà,	36tèbágúkwéékà 40àbátágúkwéékà
Indicative Relative	41bálèètá, 45àbáléétâ,	42bágúléétá 46àbágúléétâ	43tèbálèètà, 47àbátàlèètà,	44tèbágúléétà 48àbátágúléétà

Table 2. Underlying patterns.

Non-tonic class CVV /saa/	1basaa, 5abasaa,	2bagusaa 6abagusaa	3tebasaa, 7abatasaa,	4tebagusaa 8abatagusaa
Tonic class CVV /lyaa/	9balyaa, 13abalyaa,	10bagulyaa 14abagulyaa	11tebalyaa, 15abatalyaa,	12tebagulyaa 16abatagulyaa
Non-tonic class CVCV /soma/	17basoma, 21abasoma,	18bagusoma 22abagusoma	19tebasoma 23abatasoma,	20tebagusoma 24abatagusoma
Tonic class CVCV /laba/	25balaba, 29abalaba,	26bagulaba 30abagulaba	27tebalaba, 31abatalaba,	28tebagulaba 32abatagulaba
Non-tonic class CVVCV /kweeka/	33bakweeka, 37abakweeka,	34bagukweeka 38abagukweeka	35tebakweeka, 39abatakweeka,	36tebagukweeka 40abatagukweeka
Tonic class CVVCV /leeta/	41baleeta, 45abaleeta,	42baguleeta 46abaguleeta	43tebaleeta, 47abataleeta,	44tebaguleeta 48abataguleeta

Translation of a sample paradigm.

	Affirm.	Neg.
INDIC.	25balaba 'they see'	27tebalaba 'they don't see'
	26bagulaba 'they see it'	28tebagulaba 'they don't see it'
RELATIVE	29abalaba 'they who see'	31abatalaba 'they who do not see'
	30abagulaba 'they who see it'	32abatagulaba 'they who do not see it'

Symbols:

´	high level	X	'complicated'
`	low level	T	tonic mora
^	falling	N	non-tonic mora
H	high level	Q	mora, tonic or non-tonic
L	low level	‿	absence of syl. boundary
F	falling	.	syl. boundary
B	basic	|	word boundary
		_	tonic mora

Glossary:

Prefixes		Stems	
ba_	'3 pl. subj.'	saa	'grind'
gu	'3 sg. obj.'	lyaa	'eat'
te_	'neg. indicative'	soma	'read'
ta_	'neg. relative'	laba	'see'
a	'initial vowel of the relative'	kweeka	'hide'
		leeta	'bring'

Patterns of stem tonicity:

	non-tonic class	tonic class
BB (aff. indic.)	^{33}kweeka	^{41}leeta
BT (negatives)	^{35}kweeka	^{43}leeta
BX (aff. rel.)	^{37}kweeka	^{45}leeta

Tone rules:

1. $(N_n)\ (TQ^n_oN)\ (N__)\ T\ (T_n)\ (N_n) \rightarrow$

   $(N_n)\ (HH^n_oH)\ (H__)\ H\ (L_n)\ (N_n)$

   "High spreading": $(TX^n_oN)\ T$ ^{37}abákwééka ^{45}abáléétá ^{46}abágúléétá

   $(N__)T$ $^{37sg.}$akwééka

   "Dissimilation": $T(T_n)$ ^{41}bálèèta ^{47}abátàlèètà ^{48}abataguléètà

2. H| → F|

^{5}abásáâ ^{46}abágúléétâ

3. $\left\{\begin{matrix}N\\L\end{matrix}\right\}.N_n| \rightarrow L.H_n|$

^{33}bákwèèká ^{34}bágùkwééká ^{41}bálèètá

4. N → L

^{1}básàà ^{37}àbákwéékà

5. QQ| → Q|

^{5}àbásáâ → àbásâ

Domains of tone rules:

		Rule 1	Rule 3
up to and across	(-)?	yes	yes
" " " "	(+)?	no	yes
up to	(#)?	no	yes
up to	(/)?	no	no

Comparative data:

	Ga.	Ru.	Sh.
'we don't cultivate'	tètúlímâ	ntìtúrìmá	hàtírìmí
'to send a person'	òkùtúmà	kùtúmà	kùtúmá

Partial lists of environments for junctures:

/-/ between verb and conjunct complement; between aff. finite verb and enclitic; between possessive prefix and noun

/+/ between verb and disjunct complement; between elements in predicate of a neg. verb; in appositive constructions; between noun and relative verb; between a noun and a demonstrative 'that over there'

/#/ statement-final; before 'only' and 'all'; before /nga/ 'when, as'; between a noun and a demonstrative 'this' or 'the aforesaid'

/// before the main verb; between noun and numeral; after /buli/ 'each'

Tú-géé-ndá - kú kí-bú-gà. (conjunct complement)
we-go to town

Tú-gèè-ndá + kú kí-bú-gà. (disjunct complement)
we-go to town

À-bá-á-ntú + mú byá-á-ló # èbyó / bá-kò-là + èmì-rì-mù / mí-ì-ngì.
people in villages those they-do jobs many